

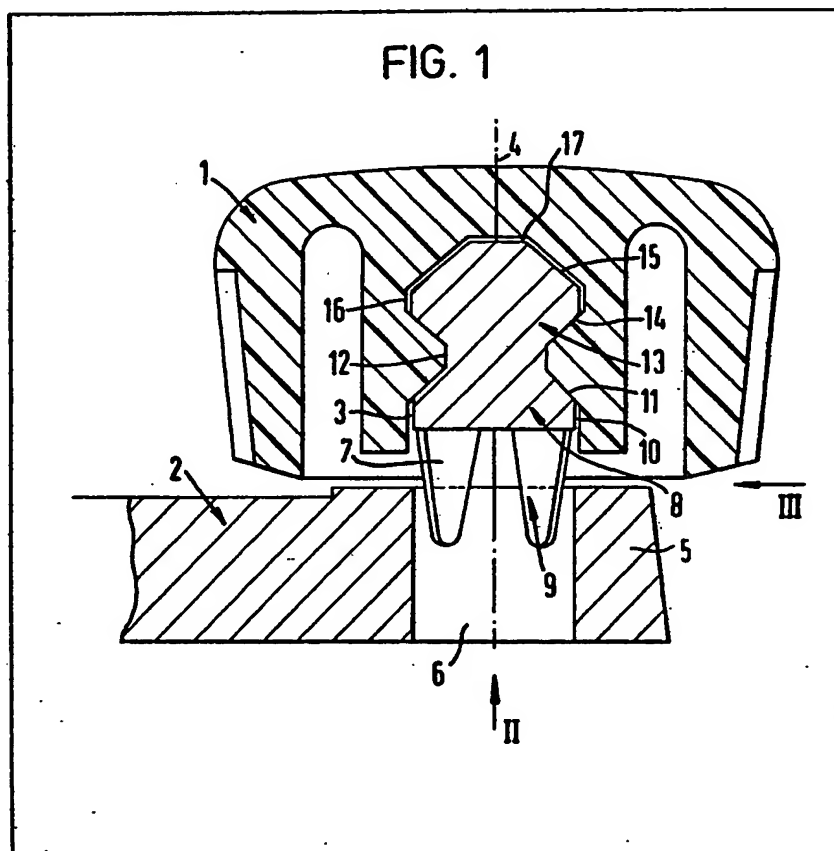
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(71) Applicants
Kigass Engineering
Limited, Kigass House,
Chapel Street,
Leamington Spa,
Warwickshire,
CV31 1EL, England
(72) Inventor
Rex Bowers
(74) Agent
Audrey E. Knowles

(54) Handle assemblies

(57) A handle assembly comprises a knob (1) rotatably mounted on a pin (8) on a handle, such as a lever or crank (2) to operate a mechanism such as a vehicle window regulator, the pin including discrete spaced apart elements (7), e.g. tapered castellations, which are designed to break under impact or stress loads so that the knob can break away from the

handle. The pin may be integral with the handle as shown or may be attached thereto by a mounting portion of the pin having camming formations cooperating with corresponding formations on a boss portion (5) of the handle. The knob and pin may have complementary frusto-conical bearing surfaces (11), (14) as shown or alternatively cylindrical bearing surfaces.



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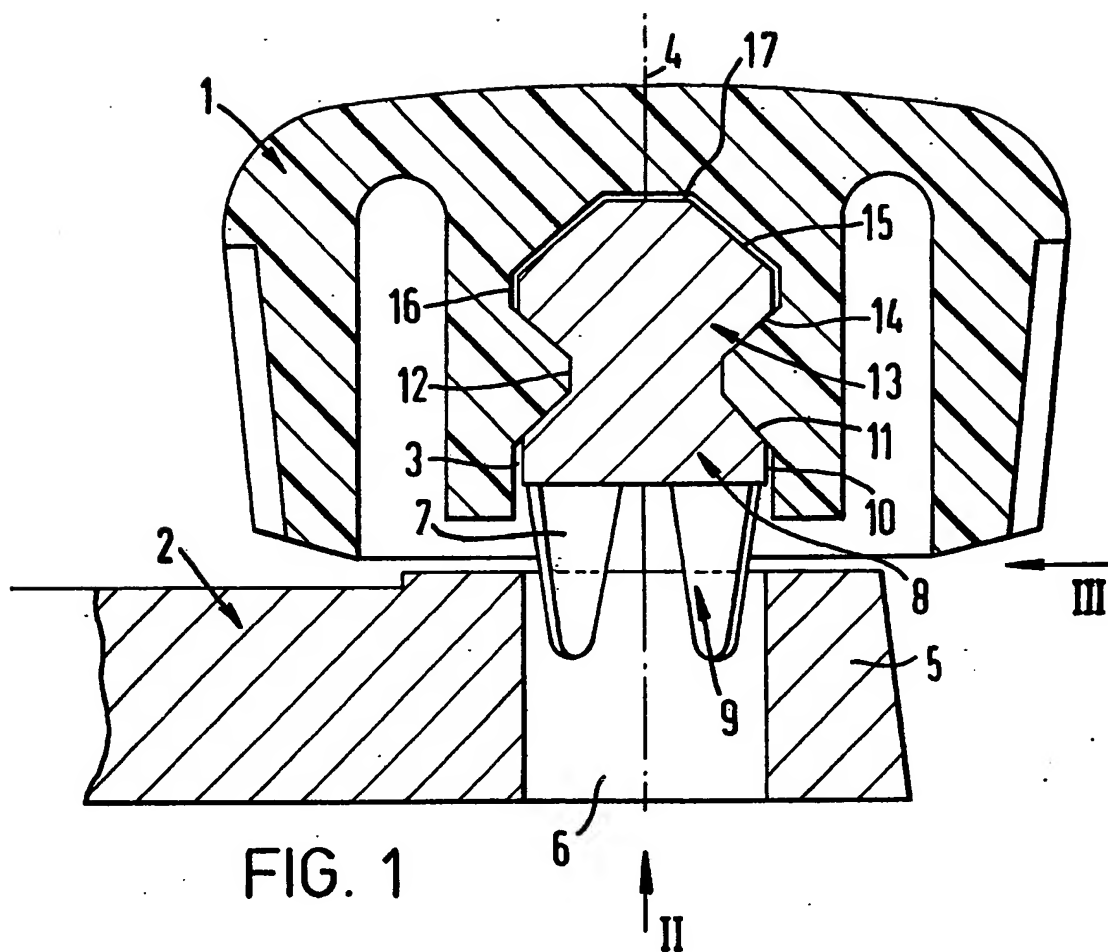


FIG. 1

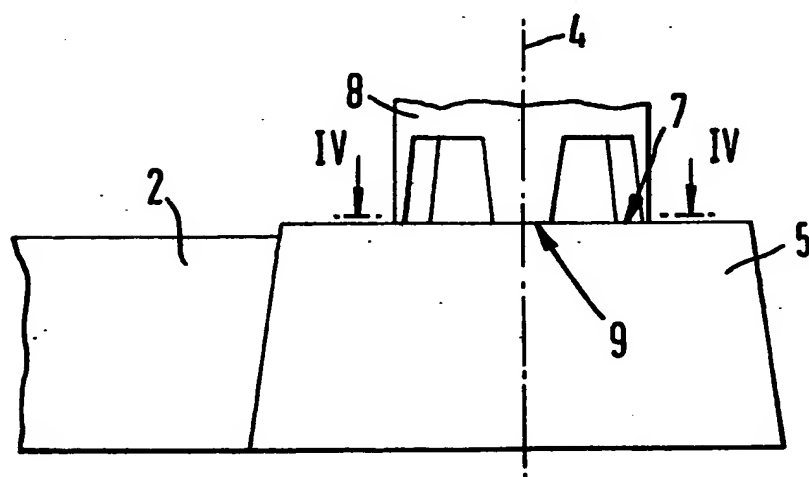


FIG. 3

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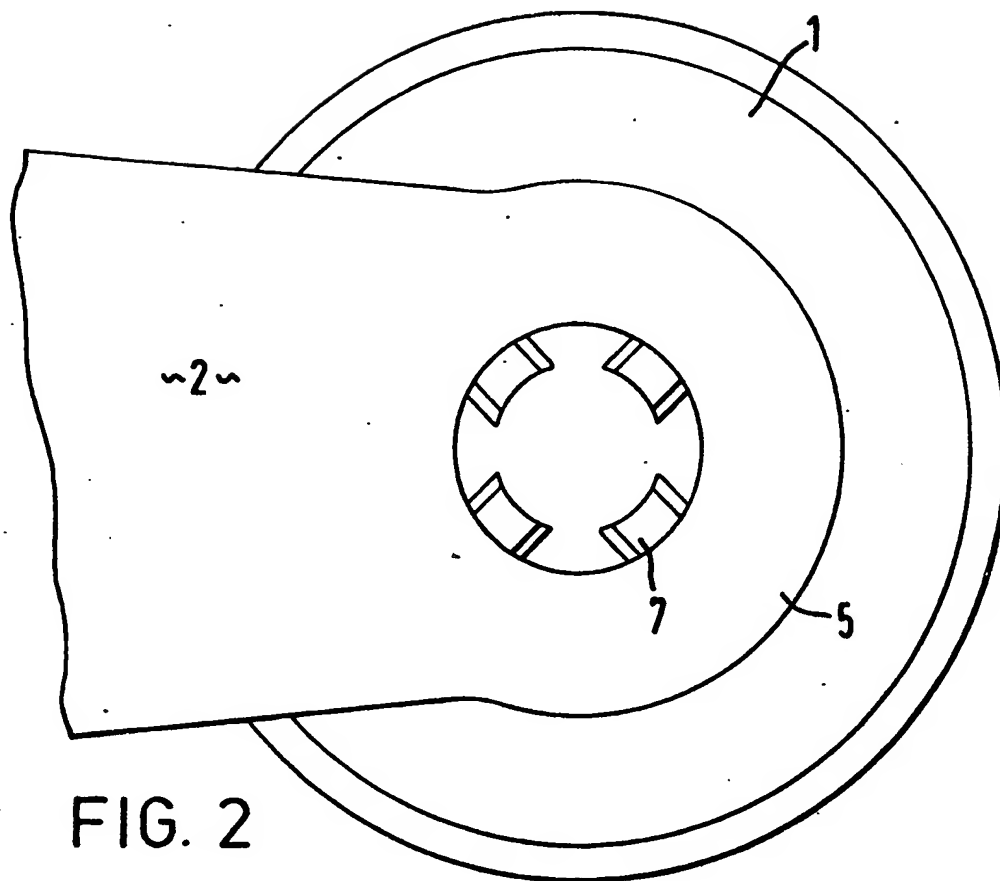


FIG. 2

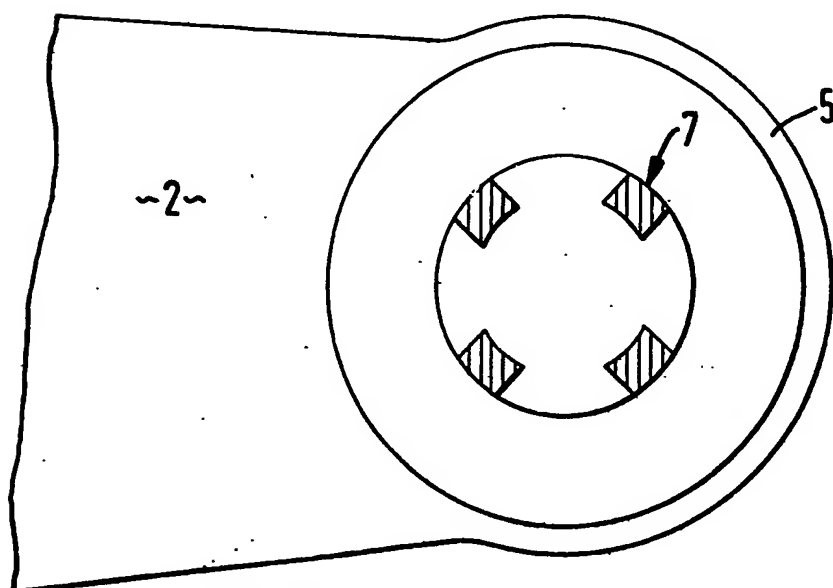
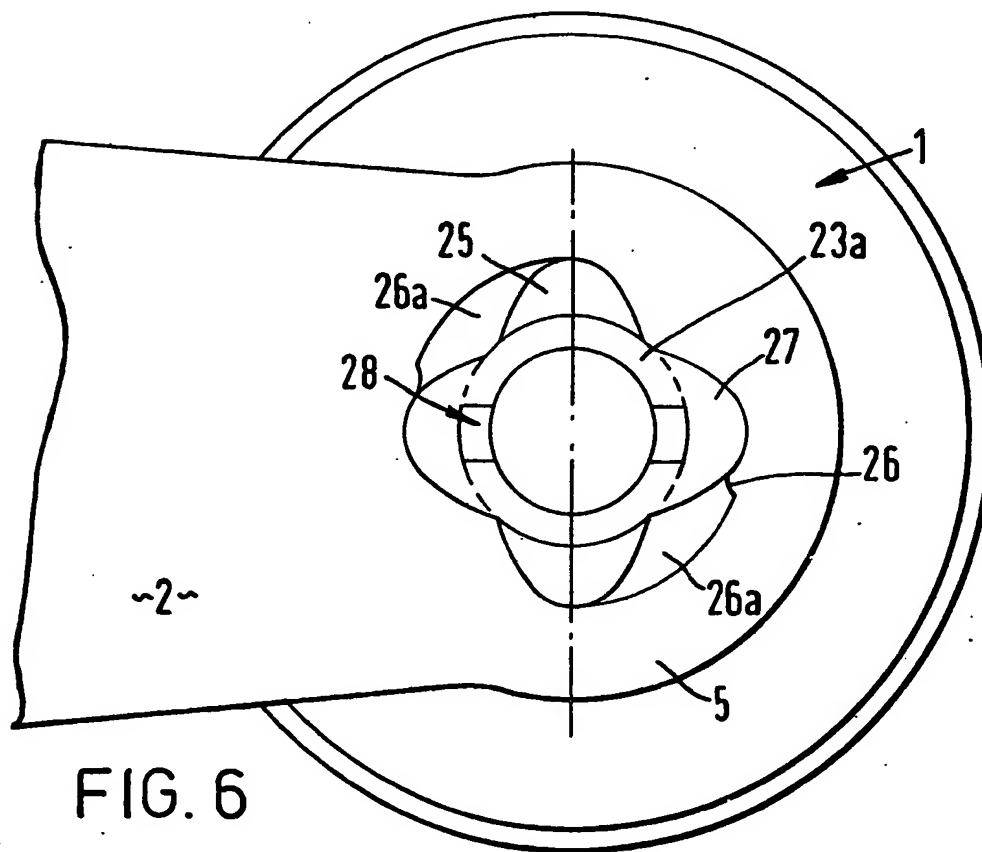
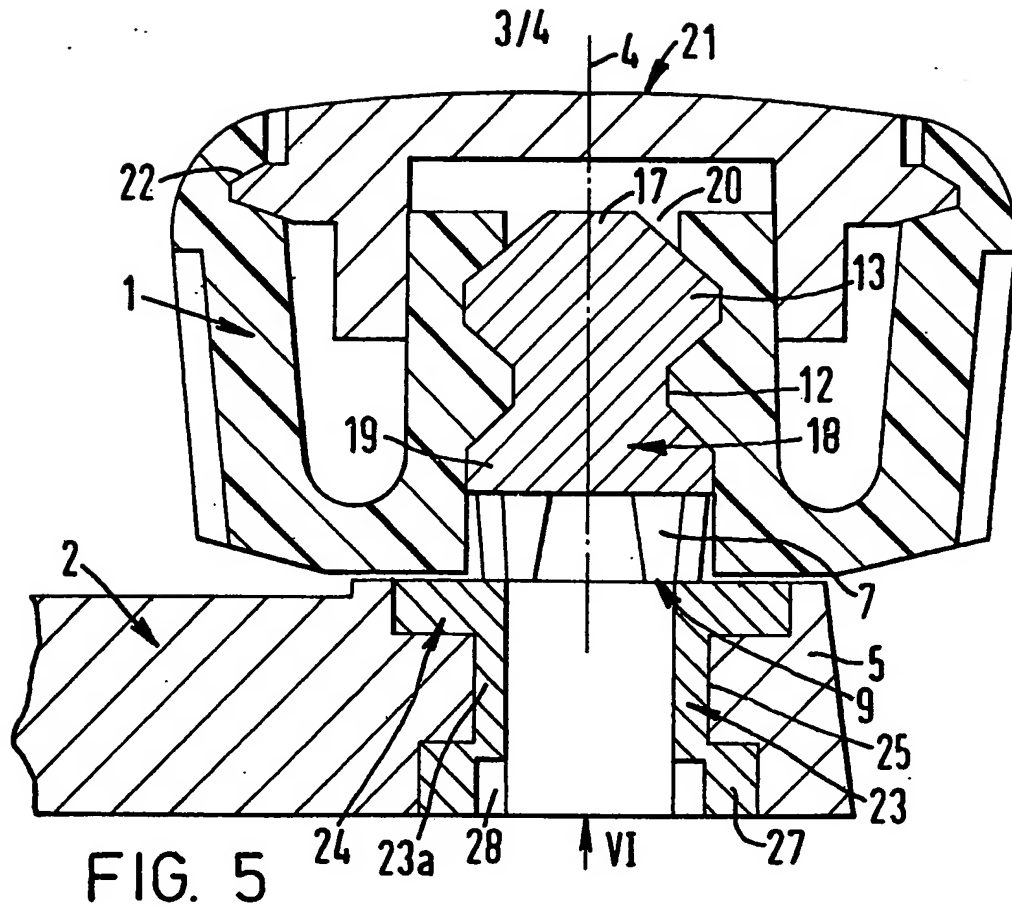
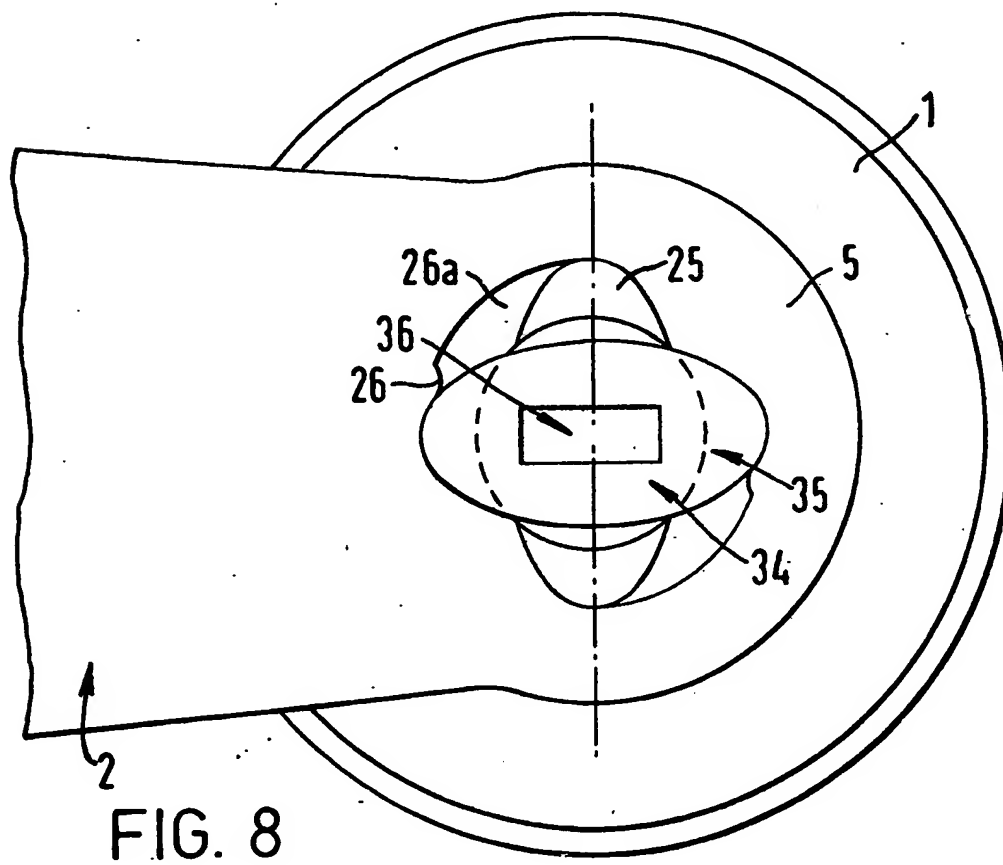
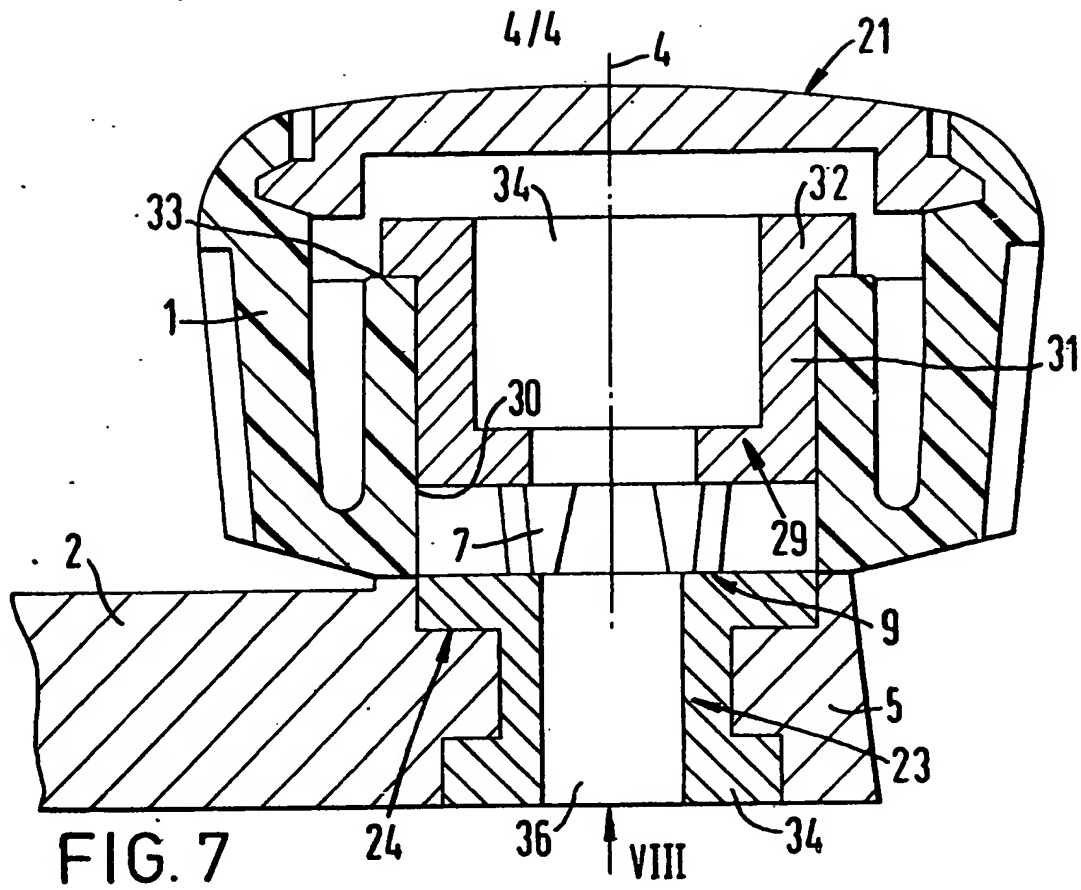


FIG. 4





SPECIFICATION

Improvements in or relating to handle assemblies

5 This invention concerns improvements in or relating to handle assemblies, in particular, but not exclusively to handle assemblies in which a handle such as a crank or lever carries a rotatable knob for moving the crank or lever comprising the handle to operate a mechanism, for instance a window regulator in a motor vehicle.

10 It will be appreciated that in such handle assemblies various requirements must be met in respect of the rotatable knob, for instance strength of the mounting thereof under load, freedom from undue high frictional resistance to rotation, and resistance to fatigue and/or corrosion. Notwithstanding these requirements, there are other regulations applicable to motor vehicles, such as for safety whereby any projection within certain specified areas or surfaces internally of a motor vehicle must yield or break-off under impact or crash conditions. This is particularly to avoid injury to an occupant of the vehicle.

15 Handle assemblies are used in vehicles for example, for window regulators as aforementioned, but rotatable knobs are used for other applications where this invention can be employed.

20 According to this invention, we provide a handle assembly comprising a handle carrying a knob for rotation relative to the handle and being mounted on the handle by means including discrete spaced apart elements that are adapted and arranged to provide weak portions, which under impact or stress breaking loads applied to the knob, break and allow the knob to break away from the handle.

25 Preferably, the means mounting the knob also provides a bearing portion on which the knob is arranged to rotate. Such mounting means may be integral with the handle or may comprise a separate member which engages with the knob and engages the handle. Preferably, where the separate member is provided, this comprises a bearing portion for rotatably mounting the knob, a break-off portion constituted by said discrete spaced apart elements extending between said knob and the handle, and a support portion engaging with the handle extending integrally from said break-off portion.

30 In a preferred arrangement, said break-off portion comprises a series of castellated formations extending from the bearing portion to the support portion, and these are in annular array and spaced evenly apart. The castellated formations may be of segmental shape in cross-section. To provide a plane of weakness for break-off, the cross-sectional area may be reduced to a specific minimum in one plane extending transverse to the axis of rotation of the knob. Conveniently, such reduction in cross-sectional area may be provided by having castellated formations of tapering shape.

Another preferred feature of the invention is to

65 provide a bearing portion which provides adequate bearing areas and also maintains proper location of the knob in use, and accommodates wear. This is achieved by providing a bearing portion having opposed truncated frusto-conical bearing faces which extend from a cylindrical face or faces which locate in a complementary recess in the knob. This feature may also be used to provide a simple fixing of the mounting means to the knob by making the mounting means and/or the knob of a suitable resilient material to enable a snap-in resilient fitting with the bearing portion being like a head that is a snap fit into the recess in the knob.

70 Alternatively, the knob may have a bearing recess which opens through the outer end face, that is remote from the handle, which opening is closed by a cover or trim closure.

75 In accordance with another important feature of this invention, where the mounting means is not integral with the handle, the support portion is also designed to provide a location for the mounting means to prevent it being pulled out from the handle, and such location may comprise at least one interlock formation such as a cam-like or wedge device, a twist-lock or key-hold, or like locking and fastening retention which enables the support portion to be inserted in the handle and then to be retained thereon by such interlock. This feature is particularly advantageous in assembly and repair or replacement of the knob and handle. Additionally, the support means may include an annular flange adapted to seat in a groove in the handle so that adequate thrust and location support is provided for normal operation and leverage applied to the handle through the knob.

80 Other features of this invention will be explained with reference to the exemplary embodiments shown in the accompanying drawings wherein:—

85 FIGURE 1 is a sectional view of a handle assembly according to this invention and depicts one end of a handle having the mounting means integral therewith and mounting a knob;

FIGURE 2 is a plan view in the direction of arrow II of Figure 1;

90 FIGURE 3 is an end view in the direction of arrow III of Figure 1;

FIGURE 4 is a section on IV—IV of Figure 3;

95 FIGURE 5 is a sectional view similar to Figure 1, but depicting a second embodiment of this invention;

100 FIGURE 6 is a plan view in the direction of arrow VI of Figure 5;

105 FIGURE 7 is a sectional view similar to Figure 1 but depicting a third embodiment of this invention; and

110 FIGURE 8 is a plan view in the direction of arrow VIII of Figure 7.

115 With reference to the first embodiment of this invention shown in Figures 1 to 4, the handle assembly comprises a knob 1, and a handle 2. The knob is moulded or otherwise formed of a plastics material to provide a conventional finger grip or knurled peripheral portion, and an internal recess 3 adapted to provide a bearing surface for rotation

of the knob 1 about an axis 4.

The handle 2 is also formed of a suitable material and there is a circular boss 5 at the end of the handle which aligns with the knob 1. There is a through-bore or central opening 6 of circular section through the handle of which the axis is co-

incident with the axis 4 of the knob. The knob 1 is mounted on the handle 2 by means of discrete elements 7 which project from the handle boss 5 in the form of tapered castellations and which carry at their ends remote from the boss 5, a bearing insert 8 which is received within the recess 3 of the knob 1. As best seen in Figures 3 and 4, each of the elements 7 is of segmental shape and the sides are inclined to provide a taper narrowing to a minimum adjacent the boss 5. The sectional area at such narrow connection is designed, having regard to the strength/load and other requirements, so as to provide a plane of weakness 9 at, or on which, any break-off will occur.

The number and size of the elements 7 may be varied, but it has been found that four is preferable to ensure both stability in the mounting and support of the knob, and to ensure for injection moulding that there is an adequate runner or gating to allow proper filling of the bearing insert 8 which is moulded integral therewith.

The bearing insert 8 comprises a first right-cylindrical face 10 which leads to a first frusto-conical face 11 adapted to engage with a complementary face in the recess 3. The first face 11 tapers to a right cylindrical neck portion 12 which locates in a rib portion of the recess 3. From the neck portion 12 there is carried an integral head 13 which has two opposed frusto-conical bearing faces 14 and 15 which are separated by a narrow right cylindrical face 16 which locates and bears on a complementary groove in the recess 3. The head 13 has a flat upper face 17 and the recess 3 has a flat surface complementary thereto.

It will be appreciated that the series of frusto-conical faces are such as to provide significant bearing areas both for the thrust and rotational loads applied through the knob, and this is of particular importance in the rotatable application and use of the handle assembly. Furthermore, by the configuration designed, the head 13 provides a snap-fit connection for the knob 1 to the handle 2 provided that the properties of both or one of the materials used permits of slight resilient deformation on assembly.

Now with reference to the second embodiment of this invention depicted in Figures 5 and 6, there is shown a separate mounting means 18 for the knob 1 on the handle 2, that is a mounting which is not integral with the handle. The mounting 18 comprises a head portion 13, a neck portion 12 and a shoulder 19 from which the integral discrete elements 7 in the form of castellations of segmental cross-section extend. This part of the mounting means 18 is substantially as afore-described with reference to the first embodiment. However, the recess 3 of the knob 1 is provided with an opening 20 leading to the flat face 17 at

the top of the head, and this opening is closed by a trim closure or cap 21 which can be a snap or push fit in an annular groove 22 in the knob body.

The plane of weakness 9 extends between the handle 2 and the knob 1 as aforescribed. However, in this embodiment, the mounting means 18 includes a support portion 23 for locating and securing the mounting means 18 on the handle 2. Firstly, the support portion 23 has a through bore and comprises an annular flange 24 which seats in a complementary groove in the boss 5. The support portion 23 has an intermediate tubular part 23a which extends through a clearance opening in the boss 5. The rear internal face of the boss 5 is formed with opposed cam faces 26 that are adapted to be engaged by suitable cam-like projections 27 extending from the support at its end remote from the flange 24. These projections 27 are such that the end of the support portion 23 can be passed through the clearance opening 25 and then the mounting means can be rotated through about 90° to give a locking action from the interference and cam action of the projections 27 with the faces 26 of the handle boss 5. The rear internal face of the boss 5 is also formed with a rebate that provides lands 26a engageable by the projections 27, and these lands or the face of the rebate can be inclined to give a wedging action on rotation of the mounting means. As the annular flange 24 locates one end of the support portion 23 this is brought into tight engagement with the handle boss on such rotation of the mounting means.

To facilitate such fitting and rotation of the mounting means, there is provided a short transverse slot or groove 28 in the support which can be engaged by a screwdriver or other tool to provide the tight interference fit on assembly. This slot 28 also enables the dismantling of the handle should it be required, and by the use of a cranked tool, the handle need not be removed from the spindle or like on which the handle is mounted.

With reference to the third embodiment of this invention depicted in Figures 7 and 8, the mounting means 29 includes the discrete elements 7 together with the support and cam-action wedging interlock as afore-described. However, the recess 30 in the knob 1 is of a right-cylindrical shape to receive the mounting means 29 which has a head in the form of a cylindrical bushing portion 31 which a flange 32 that locates on the end face 33 of the knob 1. The knob 1 is provided with a closure or trim cover 21 as afore-described with reference to Figure 5.

The bearing face provided by the cylindrical bush portion 31 is an alternative to the frusto-conical faces and in certain applications it is preferred. This is because the mounting means can be provided with a clearance passageway 34 extending in the direction of the axis of rotation 4, and the cam-action wedging projections can be provided in a similar manner as previously mentioned. In this embodiment, an avoid flange 35 forming the base of the support portion is formed with a transverse slot 36 that is accessible

through the clearance opening 34 from the knob once the cover 21 has been removed. The slot 36 may be provided as a partial bore through the support portion 23. This arrangement permits the knob to be replaced or serviced with a simple bladed screwdriver without removing the handle assembly from the actuator spindle or the like. Furthermore, in certain injection moulding methods and tooling therefor, the clearance opening 34 provides other advantages, especially for coring and ensuring proper running and filling of the die cavity.

In another variation of the interlock between the support portion with the handle or boss on the handle, more than two cam-like projections can be provided. In particular, it is envisaged that four evenly spaced projections, each in the form as previously described could be provided to co-operate with the appropriate face(s) of the handle or boss on the handle. By providing four projections, an improvement in stability for certain applications can be ensured.

It will be understood that the discrete elements shown as the castellated formations can be arranged differently without departing from the scope of the present invention. For instance, the discrete elements could be stepped to provide a shoulder or neck forming, in combination, a plane of weakness, or be provided by a series of fins or lugs extending from a head or bearing portion to the handle or support portion to be engaged in the handle, the actual arrangement depending on whether a separate mounting means or integral mounting is desirable.

CLAIMS

1. A handle assembly comprising a handle carrying a knob for rotation relative to the handle and being mounted on the handle by means including discrete spaced apart elements that are adapted and arranged to provide weak portions, which under impact or stress breaking loads applied to the knob, break and allow the knob to break away from the handle.

2. A handle assembly according to claim 1 wherein the means mounting the knob provides a bearing portion on which the knob is arranged to rotate.

3. A handle assembly according to claim 2 wherein said mounting means is integral with the handle.

4. A handle assembly according to claim 2 wherein said mounting means comprises a separate member which engages with the knob and engages the handle.

5. A handle assembly according to claim 4 wherein the separate member comprises a bearing portion for rotatably mounting the knob, a break-off portion constituted by said discrete spaced apart elements extending between said knob and the handle, and a support portion

engaging with the handle extending integrally from said break-off portion.

6. A handle assembly according to claim 5 wherein said break-off portion comprises a series of castellated formations extending from the bearing portion to the support portion and these are in annular array and spaced evenly apart.

7. A handle assembly according to claim 6 wherein the castellated formations are of segmental shape in cross-section.

8. A handle assembly according to claim 6 or claim 7 where the cross-sectional area of the castellated formations is reduced to a specific minimum on one plane extending transverse to the axis of rotation of the knob to provide a plane of weakness for break-off.

9. A handle assembly according to any one of claims 6 to 8 wherein the castellated formations are of tapering shape.

10. A handle assembly according to any one of claims 6 to 9 wherein there are four castellated formations.

11. A handle assembly according to any one of claims 2 to 10 wherein said bearing portion has opposed truncated frusto-conical faces which extend from a cylindrical face located in a complementary recess in the knob.

12. A handle assembly according to claim 11 wherein said complementary recess opens through the outer end face remote from the handle, and such opening is closed by a cover or trim closure located on the knob.

13. A handle assembly according to claim 12 wherein the mounting means comprises a separate member having an integral bearing portion, integral discrete elements and an integral support portion for locating and securing the mounting means on the handle.

14. A handle assembly according to claim 13 wherein said integral support portion is mounted and located in boss to secure the mounting means to the handle.

15. A handle assembly according to claim 14 wherein said interlocking formations comprises a cam, wedge or twistlock arrangement.

16. A handle assembly according to any one of claims 11 to 15 wherein said mounting means and/or said knob are made of a resilient material permitting the head-like bearing portion to be a snap fit in the recess in the knob.

17. A handle assembly according to any one of claims 2 to 10 wherein the bearing portion is of cylindrical shape received within a cylindrical recess in the knob.

18. A handle assembly according to claim 17 wherein the bearing portion is integral with the discrete elements and an integral support portion for locating and securing the mounting means on the handle.

19. A handle assembly according to any one of claims 13 to 18 wherein said support portion

includes an annular flange adapted to seat in a groove in the handle.

20. A handle assembly substantially as

hereinbefore described with reference to any one of the embodiments as depicted in the accompanying drawings.

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